

SECTION - I
MENTAL ABILITY AND LOGICAL REASONING
SINGLE ANSWER TYPE QUESTIONS

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct. Each correct answer carries 4 marks. No negative marks. Zero marks if not attempted.

1. In a certain code RETAIL is written as UFSBJM, how is EXPECT written in that code.
(A) FQYFDU (B) QYFUFD (C) FYQFDU (D) QYFFDU
2. If in the number 76534218 each digit is replaced by the next digit i.e., 1 is replaced by 2, 2 is by 3 and so on and then the digits are arranged in ascending order from left to right, which digit will be fifth from the left end?
(A) 6 (B) 5 (C) 7 (D) 4
3. Four of the following five are alike in a certain way and so form a group. Which is the one that doesn't belong to the group?
(A) Apple (B) Papaya (C) Litchi (D) guava
4. M is older than R. Q is younger than R and N. N is not as old as M. Who among M, N, R and Q is the oldest?
(A) M (B) R (C) M or R (D) Insufficient data
5. Direction:
Study the following arrangement carefully and answer the question given below.

R 4 E J 5 T 1 A M Q 3 8 N I K 7 W F 6 D 9 U 2 Y V

Four of the following five are like in a certain way based on their position in the above arrangement and so form a group. Which is the one that doesn't belong to that group?

- (A) J 5 4 (B) 3 8 M (C) 7 W I (D) 8 I Q

Directions (6-10) :

These questions are based upon the following information.

'A @ B' Means ' A is added to B'

'A * B' Means ' A is multiplied*by B'

'A # B' Means ' A is divided by B'

'A \$ B' Means ' B is subtracfted from A'

In each question, some information is given. You have to find out which expression correctly represents the statement.

6. The total age of 12 boys is 'X' and the total age of 13 girls is 'Y'.What is the average age (A) of all the boys and girls together.

A) $A = (X @ Y) \# 25$

B) $A = (X \$ Y) \# 25$

C) $A = (X @ Y) * 25$

D) Cant be determined.

7. Population of the state M (P_1) is less than half of the population of state N (P_2) by 1,50,000.

A) $P_2 = (P_1 \# 2) \$ 1,50,000$

B) $P_1 = (P_2 \# 2) @ 1,50,000$

C) $P_1 = (P_2 \# 2) \$ 1,50,000$

D) $P_2 = (P_1 \# 2) @ 1,50,000$

8. The number of boys (B) in a class is equal to one - fourth of three times the number of girls (G) in the class.

A) $B = (3\# G) * 4$

B) $B = (3 * G) @ 4$

C) $B = (3 * G) \# 4$

D) $B = (B \$ G) \# 4$

9. Salary of Mr. X (S_1) is more than 40% of Mr. Y's salary (S_2) by Rs. 8,000.

A) $S_1 = [S_2 * (400 @ 100)] \# 8,000$

B) $S_1 = [S_2 * (400 \# 100)] @ 8,000$

C) $S_1 = [S_2 @ (400 @ 100)] \# 8,000$

D) $S_1 = [S_2 * (100 @ 400)] \# 8,000$

10. Marks obtained by Sujith in History (H) are 85% of his marks obtained in Science (M)

A) $H = (100 \# 85) * M$

B) $H = (100 * 85) * M$

C) $H = (100 \# 85) \# M$

D) $H = (85 \# 100) * M$

11. The ratio of age of Ajay and vijay is 3 : 4, After 5 years the new ratio of the ages will be 4 : 5. What is the age of Vijay at present ?
A) 15 years B) 20 years
C) 18 years D) 24 years
12. In a class the average age of 55 students is 21 years. The average age of 25 girls is 19 years. What is the average age of the boys in the class?
A) $67/3$ years B) $107/6$ years
C) $133/6$ years D) $68/3$ years
13. In a two - digit number, the digit in the unit place is two more than the three times of the digit in the ten's place. If the sum of two digits is 6, the number is
- A) 15 B) 24 C) 51 D) 47
14. $\frac{4}{7} \times \frac{2}{3} \times ? = 1008$
A) 2688 B) 2604 C) 2667 D) 2646
15. 'A' can complete a piece of work in 12 days and 'B' can complete the same piece of work in 16 days. In how many days can 'A' and 'B' together complete the same piece of work ?
A) $16/3$ days B) $45/7$ days C) $17/3$ days D) $48/7$ days

SECTION - II

SINGLE ANSWER TYPE QUESTIONS

This section contains 5 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct. Each correct answer carries 4 marks. No negative marks. Zero marks if not attempted.

16. Which of the following is irrational?

- A) $\sqrt{1.777}$ B) $(9.123)^{-2}$
 C) $(\sqrt{5} - \sqrt{3})^2$ D) $\frac{(\sqrt{2} + 1)^2}{3 + \sqrt{8}}$

17. P : n ({ }) = 1, Q : n () = 0. The true statement is

- A) P alone B) Q alone
 C) P and Q D) Neither P nor Q

18. $f^{-1}(1/(x + 1)) = 3x - 2$ then $f(x) =$

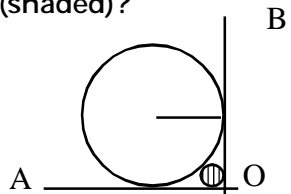
- A) $3/(x+5)$ B) $3/(x-5)$
 C) $(x+5)/3$ D) $(x-5)/3$

19. If $N^{\log_5 7} = 25$ then $N^{(\log_5 7)^2} = ?$

- A) 625 B) 5 C) 7 D) 49

20. A circle of radius 1 cm is placed against a right angle, what is the radius of smaller circle (shaded)?

- A) $1/4$ B) $3 - 2\sqrt{2}$
 C) $\sqrt{5} - 1$ D) $1/6$



SECTION - III
MULTIPLE ANSWER QUESTIONS

This section contains 5 multiple correct answer (s) type questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONE OR MORE is/are correct. Each correct answer carries 4 marks. No negative marks. Zero marks if not attempted.

21. Solve for x : $(5 + 2\sqrt{6})^{x^2-3} + (5 - 2\sqrt{6})^{x^2-3} = 10$
- A) 2 B) $\sqrt{2}$ C) $-\sqrt{2}$ D) -2
22. If $ax + by = 1$, $cx^2 + dy^2 = 1$ have only one solution then
- A) $\frac{a^2}{c} + \frac{b^2}{d} = 1$ B) $x = \frac{a}{c}$ C) $y = \frac{b}{d}$ D) none
23. $A = \begin{bmatrix} 1 & -1 \\ 4 & -1 \end{bmatrix}$; $B = \begin{bmatrix} 1 & -1 \\ 2 & -2 \end{bmatrix}$ and x, y are 2×2 matrices such that $xA = B$ and $yA = B$ then,
- A) $x = \frac{1}{3} \begin{bmatrix} 1 & -1 \\ -2 & 2 \end{bmatrix}$ B) $y = \frac{1}{3} \begin{bmatrix} 3 & 0 \\ 4 & 0 \end{bmatrix}$
- C) $|x| = |y|$ D) $3(x + y) = \begin{bmatrix} 4 & -1 \\ 2 & -2 \end{bmatrix}$
24. $A_{3 \times 3}$, $B_{3 \times 3}$ Matrices such that A is symmetric and B is skew symmetric and $(A + B) \times (A - B) = (A - B) \times (A + B)$. If $(AB)^T = (-1)^K AB$ then $K = ?$
- A) 1 B) 2 C) 3 D) 5
25. Which of the following are correct if $x = \sin 1$;
 $y = \sin 2$; $z = \sin 3$.
- A) $x < y < z$ B) $x > y > z$
- C) $y < z < x$ D) $z < x < y$

SECTION - IV
INTEGER TYPE QUESTIONS

This section contains 5 questions. The answer to each question is a single digit integer ranging from 0 to 9. The correct digit below the question number in the OMR is to be bubbled. You will be awarded 4 marks for the correct answer and zero mark if no bubbles are darkened. No negative marks.

26. The number of linear functions which maps from $[-1, 1]$ onto $[0, 2]$ are ...
27. If $xy + 2x - 3y - k$ is resolvable into two linear factors then $k=3x$, here x is
28. If $A = \begin{bmatrix} 3 & -2 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 11 \\ -5 \end{bmatrix}$ then $3x + 7y = \dots\dots\dots$
29. $\forall a, b \in \mathbb{R}, a > 1, b > 0$. If $ab = a^b$ and $\frac{a}{b} = a^{3b}$ then $a = \dots\dots\dots$
30. A, B, C can be any digit '0' through '9', possibly the same, 20 ABC01 is a perfect square. $B = 3k$, here k is

SECTION - V
MATRIX MATCHING

This Section contains 5 questions. Each question has four statements (A, B, C and D) given in Column I and four statements (P, Q, R and S) in Column II. Any given statement in Column I can have correct matching with one or more statement(s) given in Column II. For example, if for a given question, statement B matches with the statements given in Q and R, then for that particular question, against statement B, darken the bubbles corresponding to Q and R in the ORS. You will be awarded 1 marks for each correct answer. There is no negative marks awarded for incorrect answer(s).

31. $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}, B = \begin{bmatrix} -1 & 0 \\ 1 & -2 \end{bmatrix}$

A) $A + B^T$ P) $\begin{bmatrix} 0 & 3 \\ 4 & 1 \end{bmatrix}$

B) $A^T + B$ Q) $\begin{bmatrix} 0 & 5 \\ 2 & 1 \end{bmatrix}$

C) $(A + B)^T$ R) $\begin{bmatrix} 0 & 2 \\ 5 & 1 \end{bmatrix}$

D) $(A - B)^T$ S) $\begin{bmatrix} 2 & 1 \\ 4 & 5 \end{bmatrix}$

A) A -Q ; B- R; C- S; D-P;

B)A -P ; B- Q; C- R; D-S;

C) A -S ; B- Q; C- R,Q ; D-P;

D) A -S ; B- P; C- R; D-Q;

32. If α, β are roots of $3x^2 - 5x + 7 = 0$, then

A) $\alpha + \beta$ P) -190/27

B) $\alpha\beta$ Q) -17/9

C) $\alpha^2 + \beta^2$ R) 7/3

D) $\alpha^3 + \beta^3$ S) 5/3

A) A -S ; B- Q; C- R; D-P;

B)A -P ; B- Q; C- R; D-S;

C) A -S ; B- R; C- Q ; D-P;

D) A -S ; B- P; C- R; D-Q;

33. A) $\sin 2\theta$ P) $\frac{1 - \tan \theta}{1 + \tan \theta}$

B) $\cos 2\theta$ Q) $\frac{2 \tan \theta}{1 + \tan^2 \theta}$

C) $\tan 2\theta$ R) $\frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$

D) $\tan\left(\frac{\pi}{4} - \theta\right)$

S) $\frac{2 \tan \theta}{1 - \tan^2 \theta}$

- A) A -S ; B- Q; C- R; D-P;
- B)A -Q ; B- R; C- S; D-P;
- C) A -S ; B- Q; C- R,Q ; D-P;
- D) A -S ; B- P; C- R; D-Q;

34. A) $\log \sqrt{3\sqrt{3\sqrt{3\sqrt{3\sqrt{\dots}}}}}$ P) Irrational
- B) $\log 3(\log 3\{\log_{3^{1/9}} 27\})$ Q) 15/8
- C) $\log_{0.1} 0.0001$ R) Rational
- D) $\log_5 6$ S) 1
- A) A -S ; B- Q; C- R; D-P;
 - B)A -P ; B- Q; C- R; D-S;
 - C) A -S ; B- Q; C- R,Q ; D-P;
 - D) A -R,Q ; B- S,R; C- R; D-P;

35. A) $\sqrt{12 + \sqrt{2 + \sqrt{12 + \dots}}}$ P) 7
- B) $\sqrt{6\sqrt{6\sqrt{6\sqrt{\dots}}}}$ Q) 4
- C) $x = \frac{2}{(3 + \sqrt{7})}; (x-3)^2 =$ R) 6
- D) $x = 3^{2/3} + 3^{-2/3}$ then S) 82
- $9x^3 - 27x$ is
- A) A -S ; B- Q; C- R; D-P;
 - B)A -Q ; B- R; C- P; D-S;
 - C) A -Q ; B- Q; C- R,Q ; D-P;
 - D) A -S ; B- P; C- R; D-Q;

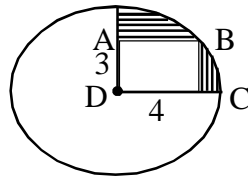
SECTION- VI
COMPREHENSION TYPE

This section contains a paragraphs. Based upon the paragraph, 5 multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct. Each correct answer carries 4 marks. No negative marks. Zero marks if not attempted.

A numerical measure expressing two dimensional extent in a plane is called AREA. The area of a geometric square of side 1 unit is unit area. The area of any planar region can be thought of as the number of such unit squares it contain. By the area of a closed curve, we mean the area of the interior region itself.

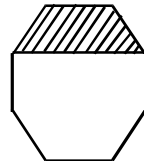
36. Area of shaded region is ...sq units.

- A) 4 & 7 B) 5 & 6
- C) 6 & 7 D) 7 & 8



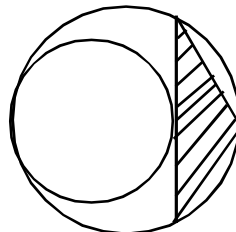
37. Ratio of area shaded to the total area of regular octagon is ?

- A) 1/3 B) 1/4
- C) 1/6 D) 2/5



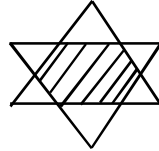
38. Radius of outer circle is 3 cm, radius of inner circle is 2 cm. area of shaded region is

- A) $4\sqrt{2}$ B) $3\sqrt{2}$
- C) $2\sqrt{2}$ D) $\sqrt{2}$



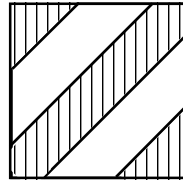
39. Two congruent triangles each with an area equal to 48 cm^2 are placed as shown. Area of the regular hexagon is cm^2

- A) 8
- B) 16
- C) 24
- D) 32



40. Side of a square is trisected, shaded area is fraction of square as

- A) $3/5$
- B) $2/3$
- C) $5/9$
- D) $3/4$



SECTION - VII

ASSERTION & REASONING

This section contains 5 reasoning type questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct. Each correct answer carries 4 marks. No negative marks for wrong answers. Zero marks if not attempted.

Codes:

- (A) Both Assertion and Reason are true and the Reason is correct explanation of the Assertion.
(B) Both Assertion and Reason are true but the Reason is not correct explanation of the Assertion.
(C) Assertion is true, but the Reason is false.
(D) Assertion is false, but the Reason is true.

41. **Assertion:-** Every relation is a function
Reason:- Every function is a relation.
42. **A :-** $A, B \neq \phi$, $n(A) = 3$, $n(B) = 5$, $\text{Max } n(A \cup B) = 5$
R :- $\text{Max } n(A \cup B) = \text{Max}(n(A), n(B))$
43. **A :-** For $0 < \theta < \pi/2$, $\sin^3 \theta > \cos^3 \theta$
R :- For $0 < \theta < \pi/2$, $\cos \theta > \sin \theta$
44. **A :-** Orthocentre of triangle having vertices as (2,3), (2,5), (4,3) is (2,3)
R :- Orthocentre of right triangle is mid point of its hypotenuse.
45. **A :-** Inclination of $\sqrt{3}x + y - 2 = 0$ is $2\pi/3$
R :- Inclination of $ax + by + c = 0$ is $\tan \theta = -a/b$.

SECTION - VIII

CONCEPTUAL QUESTIONS

This section contains 5 reasoning type questions. Each question has 4 choices (A), (B), (C) and (D), out of which ONLY ONE is correct. Each correct answer carries 4 marks. 1 mark will be deducted for wrong answer. Zero marks if not attempted.

46. Angle made by line joining (5,2), (6,-15) at (0,0) is

- A) $\pi/6$ B) $\pi/4$ C) $\pi/2$ D) π

47. $\tan(45^\circ + \theta) \cdot \tan(45^\circ - \theta) =$

- A) 0 B) 1 C) -1 D) 2

48. $f(x) = \frac{x+1}{x-1}, x \neq 1$, then $(f \circ f \circ f \circ f)(x) = \dots$

- A) x B) $f(x)$ C) $-x$ D) $-f(x)$

49. $x = \frac{a^n + a^{-n}}{a^n - a^{-n}}$ then $\log_a \left(\frac{x+1}{x-1} \right)$

- A) n B) $n/2$ C) $2n$ D) $-n$

50. If A and B are two square matrices such that

$B = -A^{-1}BA$ then, $(A+B)^2 = \dots$

- A) 0 B) $A^2 + B^2$ C) $A^2 + 2AB + B^2$ D) $A + B$